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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/786,366	02/26/2004	Hideo Murayama	046124-5276	3387
9629	7590	11/03/2005	EXAMINER	
MORGAN LEWIS & BOCKIUS LLP			ZETTL, MARY E	
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WASHINGTON, DC 20004			PAPER NUMBER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

15

Office Action Summary	Application No. 10/786,366	Applicant(s) MURAYAMA ET AL.	
	Examiner Mary Zettl	Art Unit 2878	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 7 and 9-13 is/are rejected.
- 7) ☒ Claim(s) 4-6 and 8 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☒ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>4/16/2004</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Priority

1. Acknowledgment is made of applicant's claim for foreign priority based on an application filed in Japan on 3/12/2003. It is noted, however, that applicant has not filed a certified copy of the JP 2003-067094 application as required by 35 U.S.C. 119(b).

Claim Rejections - 35 USC § 102

2. Claims 1 and 2 are rejected under 35 U.S.C. 102(b) as being anticipated by Gijutsucho et al. (JP 63-047686).

Regarding claim 1, Gijutsucho et al. teach a radiation three-dimensional position detector (Abstract; Drawing 1), comprising: a light receiving element (Drawing 1, item 2) having a light receiving plane; which outputs an electric signal corresponding to the incident position and intensity of light incident on the light receiving plane; and a scintillator unit having scintillator cells (Drawing 1, item 1) each of which produces scintillation light corresponding to the radiation absorbed thereby, wherein K layers of scintillator arrays (K is an integer number of 2 or greater), each having the scintillator cells arrayed in M rows--N columns two-dimensional matrix (each of M and N is an integer number of 2 or greater), are laminated on the light receiving plane of said light receiving element, and wherein at least one of side faces of a scintillator cell C(k1,m,n) included in a scintillator array of the k1-th layer has different optical characteristic from that of the corresponding side face of a scintillator cell C(k2,m,n) included in a scintillator array of the k2-th layer, said corresponding side face being located at the

Art Unit: 2878

same two-dimensional position as said one of side faces in a plane parallel to the right receiving plane, provided that $C(k,m,n)$ is defined as a scintillator cell located at m -th row and a n -th column within a scintillator array of the k -th layer ($1 \leq k \leq K$, $1 \leq m \leq M$, $1 \leq n \leq N$).

Regarding claim 2, Gijutsucho et al. teach a radiation three-dimensional position detector (Abstract; Drawing 1), comprising: a light receiving element (Drawing 1, item 2) having a light receiving plane, which outputs an electric signal corresponding to the incident position and intensity of light incident on the light receiving plane; and a scintillator unit having scintillator cells (Drawing 1, item 1) each of which produces scintillation light corresponding to the radiation absorbed thereby, wherein K layers of scintillator arrays (K is an integer number of 2 or greater), each having the scintillator cells arrayed in M rows-- N columns two-dimensional matrix (each of M and N is an integer number of 2 or greater), are laminated on the light receiving plane of said light receiving element, wherein each of the scintillator cells is separated from the adjacent scintillator cells by partition mediums (thin transparent plates and reflecting material; Drawing 1, items 3 and 4), and wherein at least one of side faces of a scintillator cell $C(k_1,m,n)$ included in a scintillator array of the k_1 -th layer is faced with the partition medium which has different optical characteristic from that of the partition medium facing the corresponding side face of a scintillator cell $C(k_2,m,n)$ included in a scintillator array of the k_2 -th layer, said corresponding side face being located at the same two-dimensional position as said one of side faces in a plane parallel to the right receiving plane, provided that $C(k,m,n)$ is defined as a scintillator cell located at m -th row and a n -

Art Unit: 2878

th column within a scintillator array of the k-th layer (Figure 2 shows item 7, reflective material only in one layer).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gijutsucho et al. (JP 63-047686) in view of Sumiya et al. (US 2005/0087693 A1). Regarding claim 3, Gijutsucho et al. teach the limitations set forth in claim 2, however do not disclose expressly a position detector characterized in that the scintillator cell is cuboidal in shape. Sumiya et al. disclose cuboidal crystals (1.0 mm x 1.0 mm to 10 mm x 10 mm; page 3, paragraph 36). At the time the invention was made it would be

obvious to one of ordinary skill in the art to take the invention of Gijutsucho et al. and modify it such that the scintillator cells were cuboidal in shape so that efficiency is achieved when the cells are arranged in a three dimensional scintillator unit and also so that the manufacturing process is simplified.

4. Claims 7 and 9-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gijutsucho et al. (JP 63-047686) in view of Moisan et al. (US 6,087,663 A).

Regarding claim 7, Gijutsucho et al. teach the limitations set forth in claim 2. Gijutsucho et al. further teach generating output signals from the light receiving elements and taking the ratio of the output signals to determine the detection position (Abstract). Gijutsucho et al. do not disclose expressly an operation section that utilizes an electric signal output from the scintillator unit to determine the position where the radiation is absorbed. One of ordinary skill in the art would recognize that the use of an operation section based on electrical signals is the standard method for collecting position information. Moisan et al. teach an apparatus capable of determining the transverse and longitudinal coordinates of light emission induced by the interaction of photons in an array of photon detectors having a plurality of scintillation light guides (col. 1, lines 9-13), comprising an operation section (amplifier, discriminator, adder, and display device; Figure 3(a), items 32, 33, 34, and 35) that calculates the three dimensional position (X, Y, and Z (longitudinal); col. 12, lines 35-53) where the radiation is absorbed in the scintillator unit based on the electric signal, the electric signal being output from the light receiving element (Figure 3(a), item 21), wherein the scintillation

Art Unit: 2878

light produced in the scintillation unit is made incident on the light receiving plane. At the time the invention was made, it would be obvious to one of ordinary skill in the art that the invention of Gijutsucho et al. would include an operation section similar to the one suggested by Moisan et al. such that the position where radiation is absorbed can be determined efficiently and accurately.

Regarding claim 9, Gijutsucho et al. in view of Moisan et al. teach the limitations set forth in claim 7. Moisan et al. further teach the light receiving elements having a plurality of output terminals (optical fibers; col. 12, line 22) for outputting the electric signals. Moisan et al. further teach that the operation section processes the electric signals outputted from the plurality of output terminals of the light receiving element (Figure 3(a), item 21) to obtain an incident position of the scintillation light on the light receiving plane and calculate the three dimensional position (col. 12, lines 46-47 and line 51-52) where the radiation is absorbed in the scintillator based on the incident position of the scintillation light. At the time the invention was made, it would be obvious to one of ordinary skill in the art that the invention of Gijutsucho et al. would include an operation section similar to the one suggested by Moisan et al. such that the position where radiation is absorbed can be determined efficiently and accurately.

Regarding claim 10 and 12, Gijutsucho et al. in view of Moisan et al. teach the limitations set forth in claim 7. Moisan et al. further teach the light receiving elements having a plurality of output terminals (optical fibers; col. 12, line 22) coupled to each light guide corresponding to each scintillator cell for outputting the electric signals. Moisan et al. further teach that the operation section calculates the energy of the

Art Unit: 2878

radiation absorbed in the scintillator unit based on a sum of values of electric signals outputted from each of the plurality of output terminals of the light receiving elements (col. 17, lines 1-3 and col. 2, lines 12-17). At the time the invention was made it would be obvious to one skilled in the art that a means for calculating the energy of the radiation absorbed such as the conventional means described by Moisan et al. would be included in the invention of Gijutsucho et al.

Regarding claim 11 and 13, Gijutsucho et al. in view of Moisan et al. teach the limitations set forth in claim 7. Moisan et al. further teach the light receiving elements having a plurality of output terminals (optical fibers; col. 12, line 22) coupled to each light guide corresponding to each scintillator cell for outputting the electric signals. Moisan et al. further teach that the operation section calculates the energy of the scintillation light generated in the scintillator unit based on a sum of values of electric signals outputted from the plurality of output terminals from each of the light receiving elements (col. 17, lines 1-3 and col. 2, lines 12-17). At the time the invention was made it would be obvious to one skilled in the art that a means for calculating the energy of the scintillation light generated, such as the conventional means described by Moisan et al., would be included in the invention of Gijutsucho et al.

Allowable Subject Matter

5. Claims 4, 5, and 8 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Regarding claims 4, 5, and 8, Hideo et al. (JP 63-047686) discloses partition medium (transparent plates; Drawing 1, item 3) inserted between scintillator cells. Hideo et al. further disclose replacing some of these plates with a different partition medium (reflecting material; Drawing 1, item 4). Prior art does not teach or make obvious an area enclosed by the partition medium of the reflective material in the k_1 -th layer scintillator array occupying a different region in the plane parallel to the right receiving plane from a region occupied by an area enclosed by the partition medium of the reflective material in the k_2 -th layer scintillator array. Moreover prior art does not teach or make obvious the k_1 -th layer scintillator array, in which each partition medium between a scintillator cell $C(k_1, p, n)$ and a scintillator cell $C(k_1, p+1, n)$ and each partition medium between a scintillator cell $C(\text{sub}.k_1, m, q)$ and a scintillator cell $C.\text{sub}.k_1, m, q+1$ are made up of reflective materials with respect to said scintillation light, and the other partition mediums are made up of translucent materials with respect to said scintillation light (each of p and q is an integer number in an arithmetic progression with a tolerance of 2, $1 \leq p < M$ $1 \leq q < N$); in said k_2 -th layer scintillator array, each partition medium between a scintillator cell $C(k_2, r, n)$ and a scintillator cell $C(k_2, r+1, n)$ and each partition medium between a scintillator cell $C(k_2, m, s)$ and a scintillator cell $C(k_2, m, s+1)$ are made up of reflective materials with respect to said scintillation light, and the other partition mediums are made up of translucent materials with respect to said scintillation light (each of r and s is an integer number in an arithmetic progression with a tolerance

Art Unit: 2878

of 2, $1 \leq r < M$, $1 \leq s < N$, "p is not equal to r" and/or "q is not equal to s"). In this setup the position of the barycenter of the scintillation light incidence on the light incident plane in the light receiving element corresponds to the scintillation light generation point. In addition, the range of the intensity of the distribution of scintillation light in the light incident plane of the light receiving element is satisfactorily narrow.


Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mary Zettl whose telephone number is (571) 272-6007. The examiner can normally be reached on M-F 8am-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on (571) 272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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